

## EOS Mission Support Network Performance Report

This is a monthly summary of EMSnet performance testing -- comparing the measured performance against the requirements. Currently using updated BAH requirements (Oct '02), including missions through 2006.

All results are reported on the web site:

[http://corn.eos.nasa.gov/performance/Net\\_Health/EMSnet\\_list.html](http://corn.eos.nasa.gov/performance/Net_Health/EMSnet_list.html).

It shows MRTG-like graphs of the performance to various test sites, including thruput, RTT, packet loss, and hops, with 1 week, 2 month and 6 month graphs.

### **Highlights:**

- The requirements have been updated again. The biggest change was the addition of 30 mbps from LaRC to JPL for TES, beginning in June '03. Other requirements changes also affected ratings – they are noted in the site detail sections below.
- Additional requirements were included –mostly return flows with a lower requirement than the flows previously reported. But also including the JPL→NSIDC AMSR flow not previously reported. These new requirements are discussed in detail in the site detail sections below. They are also included in the summary graphs.
- Two small changes in methodology were implemented this month; both reducing the user flow values reported. Previously, the raw MRTG values were reported as user flow. But this overstates the actual user flow, due to two factors. First, the MRTG includes protocol bits, which are not actual user data. While this is indeed necessary, the requirements are expressed in terms of the actual user data. So the values obtained from MRTG are “discounted” to remove the estimated protocol components. The discount is 10% for MRTG on an Ethernet or serial line, and 20% on an ATM VC.

Secondly, these thruput tests induce data traffic which is counted by MRTG, but does not represent actual user flow. This amount is therefore subtracted from the measured MRTG.

- Most test results were stable – any ratings changes are the result of requirements changes.

**Ratings:****Rating Categories:**

**Excellent**:  $\text{Total Kbps} > \text{Requirement} * 3$   
**Good**:  $1.3 * \text{Requirement} \leq \text{Total Kbps} < \text{Requirement} * 3$   
**Adequate**:  $\text{Requirement} < \text{Total Kbps} < \text{Requirement} * 1.3$   
**Low**:  $\text{Total Kbps} < \text{Requirement}$   
**Bad**:  $\text{Total Kbps} < \text{Requirement} / 3$

Where Total Kbps = User Flow + iperf monthly average

**New Ratings:**

JPL → GSFC: Good  
 LaRC → JPL (Oct '03): **Bad**  
 LaRC → GSFC (Oct '02): **Excellent**  
 NSIDC → GSFC ('02, '03): **Good**  
 LaRC → NSIDC: **Excellent**  
 JPL → NSIDC (Oct '02): **Excellent**

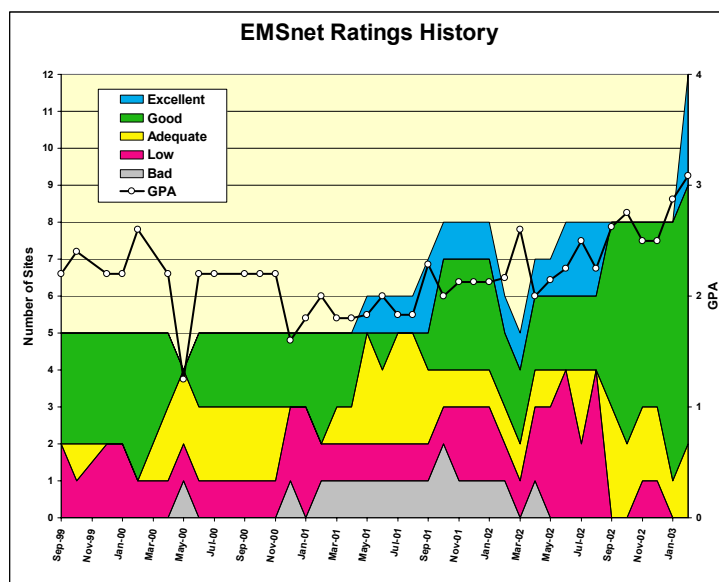
**Upgrades:** ↑

GSFC → JPL: Good → Excellent  
 GSFC → NASDA (Oct '02): **Good**

**Downgrades:** ↓

EDC (Oct '02): Good → **Adequate**  
 EDC (Oct '03): Adequate → **Low**  
 ERSDAC: Good → **Adequate**

The chart below shows the number of sites in each classification since EMSnet testing started in September 1999. Note that these ratings do NOT relate to absolute performance -- they are relative to the EOS requirements. The GPA is calculated based on Excellent: 4, Good: 3, Adequate: 2, Low: 1, Bad: 0



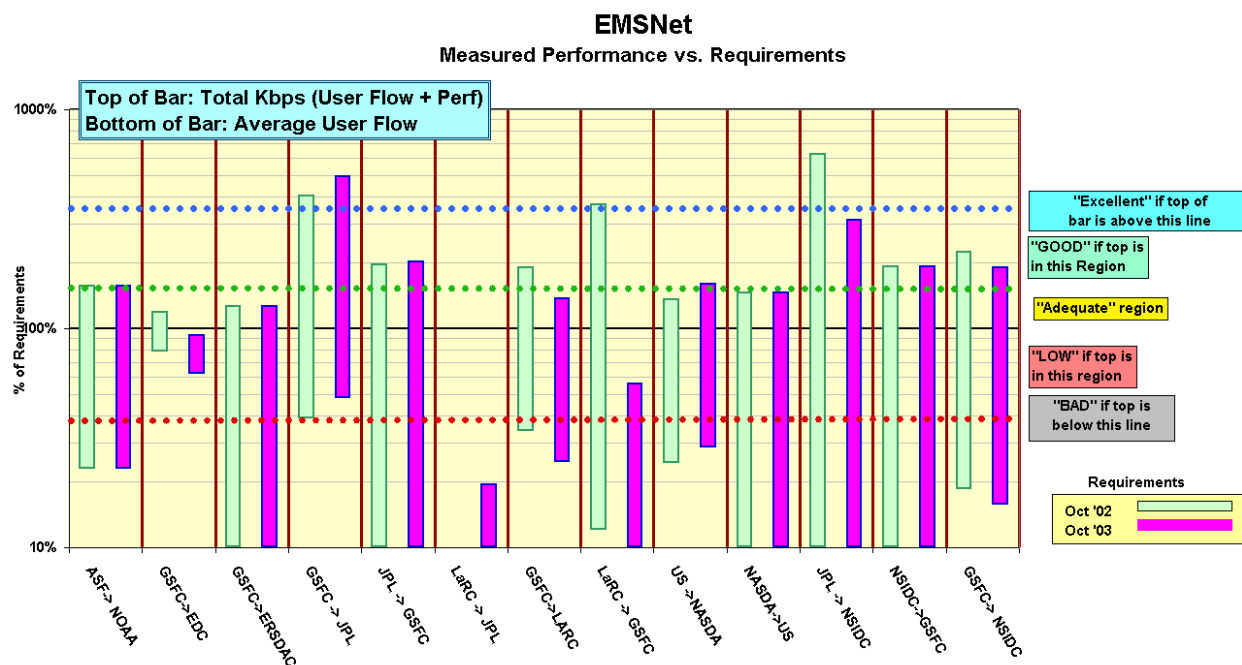
# EMSnet Sites:

## Network Requirements vs. Measured Performance

February 2003		Requirements (kbps)		Testing							
Source -> Destination	Team (s)	Current	Future	Source Node : Test Period	Avg User Flow kbps	Perf Avg kbps	Total Avg kbps	Current Status re	Prev Stat	Current Status re	
		Oct-02	Oct-03					Oct-02		Oct-03	
ASF-> NOAA	ADEOS II	1864	1864	ASF->NESDIS: 29-Nov-02 - 28-Feb-03	424	2496	2920	GOOD	L	GOOD	
GSFC->EDC	MODIS, LandSat	170741	216574	DOORS-EDCTest: 01-Feb-03 - 28-Feb-03	134050	68344	202394	Adequate	G	LOW	
GSFC->ERSDAC	ASTER	664	664	GDAAC: 03-Jan-03 - 28-Feb-03	57	778	835	Adequate	L	Adequate	
GSFC -> JPL	ASTER, QuikScat, MLS, etc.	1609	1300	CSAFS: 15-Aug-02 - 28-Feb-03	622	5849	6471	Excellent	G	Excellent	
JPL -> GSFC	ADEOS II, AMSR, etc.	4863	4693	JPL -> GSFC: 13-Jan-03 - 28-Feb-03	306	9187	9493	GOOD		GOOD	
LaRC -> JPL	TES	0	30585	LDAAC: 15-Aug-02 - 28-Feb-03	17	5893	5910	n/a		BAD	
GSFC->LARC	CERES, MISR, MOPITT	37727	52664	GDAAC: 01-Jan-03 - 28-Feb-03	12868	59019	71887	GOOD	G	GOOD	
LaRC -> GSFC	MODIS, TES	6777	44795	LDAAC --> GDAAC: 09-Sep-02 - 28-Feb-03	813	24166	24979	Excellent		LOW	
US ->NASDA	QuikScat, TRMM, AMSR	1612	1379	CSAFS: 23-Aug-02 - 28-Feb-03	392	1807	2199	GOOD	A	GOOD	
NASDA->US	AMSR	1559	1559	ASDA->JPL-SEAPAC: 02-Oct-02 - 28-Feb-03	0	2279	2279	GOOD	G	GOOD	
JPL -> NSIDC	AMSR	770	1540	JPL: 13-Jan-03 - 28-Feb-03	0	4813	4813	Excellent		Excellent	
NSIDC->GSFC	MODIS, ICESAT, QuikScat	8313	8313	NSIDC -> GDAAC: 23-Oct-02 - 28-Feb-03	163	15716	15879	GOOD		GOOD	
GSFC-> NSIDC	MODIS, ICESAT, QuikScat	32603	38234	GDAAC: 05-Nov-02 - 28-Feb-03	5996	67008	73004	GOOD	G	GOOD	
Notes:		All flow requirements listed are the greater of inflow or outflow				Ratings					
		Flow Requirements (from BAH) include TRMM, Terra , Aqua, QuikScat, ADEOS II				Summary		Oct-02		Oct-03	
								Score	Prev	Score	
*Criteria:	Excellent	Total Kbps > Requirement * 3				Excellent		3	0	2	
	GOOD	1.3 * Requirement <= Total Kbps < Requirement * 3				GOOD		7	5	7	
	Adequate	Requirement < Total Kbps < Requirement * 1.3				Adequate		2	1	1	
	LOW	Total Kbps < Requirement				LOW		0	2	2	
	BAD	Total Kbps < Requirement / 3				BAD		0	0	1	
Change History:		27-Sep-99	Original - TRMM, Terra, and QuikScat			Total		12	8	13	
		19-Jan-01	Incorporated BAH requirements including additional missions				GPA		3.08	2.38	2.54
		9-Apr-01	Updated BAH requirements								
		4-Jun-01	Added 50% contingency to BAH requirements								
		16-Nov-01	Added MRTG to lperf, updated requirements, Revised criteria								
		2-Oct-02	Updated to revised BAH requirements								
		7-Mar-03	Updated Requirements, Added tests to GSFC, improved User flow calculation								

## Comparison of measured performance with Requirements:

This graph shows two bars for each source-destination pair. Each bar uses the same actual measured performance, but compares it to the requirements for two different times (Oct '02, and Oct. '03). Thus as the requirements increase, the same measured performance will be lower in comparison.



Note: this chart shows that the performance to most sites is remarkably close to requirements. In the past, some sites have had performance way above the requirements, others way below.

Also note that the interpretation of these bars has changed from Sept '01. The bottom of each bar is the average measured MRTG flow to that site (previously daily minimum). Thus the bottom of each bar can be used to assess the relationship between the requirements and actual flows. Note that the requirements include a 50% contingency factor above what was specified by the projects, so a value of 66% would indicate that the project is flowing as much data as requested.

## Details on individual sites:

### 1) ASF ↔ CONUS:

Rating: Continued **Good**Web Page: [http://corn.eos.nasa.gov/performance/Net\\_Health/files/ASF-EMS.html](http://corn.eos.nasa.gov/performance/Net_Health/files/ASF-EMS.html)

Test Results:

Source → Dest	Medians of daily tests (kbps)			User Flow	TOTAL
	Best	Median	Worst		
ASF → NESDIS	2543	2496	666	424	2920
ASF → GSFC-CSAFS	2515	1680	735		
ASF → JPL-SEAPAC	2799	2607	1306		
GSFC-CSAFS → ASF	2073	1428	631	47	

Requirements:

Source → Dest	FY	mbps	Rating
ASF → NESDIS	'02, '03	1.61	<b>Good</b>

**Comments:** The 2.9 mbps total is very good for a 2 \* T1 (3.1 mbps) circuit. Since this is more than 30% over the Oct '02 requirement, the rating is "Good".

The user flow increased this month (was 436 last month) – even with the reductions described above.

### 2) GSFC → EDC:

Rating: ↓ Good → **Adequate**Web Page: [http://corn.eos.nasa.gov/performance/Net\\_Health/files/EDC.html](http://corn.eos.nasa.gov/performance/Net_Health/files/EDC.html)

Test Results:

Source → Dest	Medians of daily tests (mbps)			User Flow	TOTAL
	Best	Median	Worst		
DOORS → EDC Test	147.9	68.3	47.3	134.0	202.4
DOORS → EDC DAAC	148.0	58.1	35.8		
G-DAAC → EDC DAAC	109.7	40.2	22.7		

Requirements:

Date	mbps	Rating
Oct '02	170.7 (prev 147.2)	<b>Adequate</b>
Oct '03	216.6 (prev 228.0)	<b>Low</b>

The three test cases above continue to show the effects of the DAAC firewalls: the test shown on the top row has no firewalls in the path, just vBNS+. The next test goes through the EDC firewall, and the last test goes through both the GSFC and EDC firewalls. From these values, it does not appear that the EDC firewall has much of an effect on throughput, but the GSFC firewall does.

This month the user flows were stable (but counted as lower due to the revised methodology). However, the corresponding throughput tests were also somewhat lower, with the total therefore about 30 mbps lower. Additionally, the new requirement is higher than the previous value. The combined MRTG + throughput is no longer 30% above the Oct '02 requirement, so the rating is drops to "Adequate". The total is also now lower than the Oct '03 requirement, lowering that rating to "Low".

**3) JPL:**

Ratings: GSFC → JPL: ↑ Good → **Excellent**  
 JPL → GSFC: **Good**  
 LaRC → JPL (Oct '03): **Bad**

Web Pages:

[http://corn.eos.nasa.gov/performance/Net\\_Health/files/JPL-SEAPAC.html](http://corn.eos.nasa.gov/performance/Net_Health/files/JPL-SEAPAC.html)  
[http://corn.eos.nasa.gov/performance/Net\\_Health/files/JPL-PODAAC.html](http://corn.eos.nasa.gov/performance/Net_Health/files/JPL-PODAAC.html)  
[http://corn.eos.nasa.gov/performance/Net\\_Health/files/JPL-TES.html](http://corn.eos.nasa.gov/performance/Net_Health/files/JPL-TES.html)

Test Results:

Source → Dest	Medians of daily tests (mbps)			User Flow	TOTAL
	Best	Median	Worst		
GSFC-CSAFS → JPL-SEAPAC	6.1	5.8	3.7	0.6	6.5
LaRC DAAC → JPL-TES	6.0	5.9	4.4	0.02	5.9
GSFC-MTVS1 → JPL-PODAAC	5.9	5.7	4.7		
JPL-PODAAC → GSFC DAAC	11.5	9.2	5.6	0.3	9.5

Requirements:

Source → Dest	Date	mbps	Rating
GSFC → JPL combined	Oct '02	1.61 (prev 2.82)	<b>Excellent</b>
GSFC → JPL combined	Oct '03	1.30 (prev 6.89)	<b>Excellent</b>
JPL → GSFC combined	Oct '02	4.86	<b>Good</b>
LaRC DAAC → JPL-TES	Oct '03	30.6	<b>Bad</b>

The GSFC-JPL requirement above was revised in August '02 to include all flows on the GSFC-JPL circuit, including flows from LaRC and flows to NASDA and ASF. The rating is based on testing via EMSnet from CSAFS at GSFC to SEAPAC at JPL. Note that the MRTG value above also includes these flows.

Performance on this circuit has been very stable since the BOP switchover on 15 August '02. With the revised combined requirement of 1.6 mbps (previously 2.8 mbps), the rating improves to "Excellent". The drop in the Oct '02 requirement is due to a re-evaluation of the AMSR flow from GSFC to NASDA (via JPL). The drop in the Oct '03 requirement is based on the LaRC – TES flow not being sent via GSFC.

Performance from LDAAC to JPL-TES has also been very stable since it improved from 2.9 to 6.0 mbps on Aug 15, due to BOP. However, the new Oct. '03 requirement for this flow is 30 mbps. This is well above the current capability, which was not designed to accommodate this flow (the current route is via NSIDC). Accordingly, an NSR is in progress to provide a direct VC with increased capability.

The route from GDAAC to JPL-TES and JPL-PODAAC changed to EMSnet on 12 February '03 – it had been using NISN SIP since May 8 '02. However, GSFC to JPL-PODAAC performance testing is still sourced from MTVS1. Performance has been very steady at 6 mbps since the BOP upgrade on 15 August '02.

A new requirement is being tracked, from JPL to GSFC. It includes flows from NASDA and ASF which go via JPL, and includes GSFC and NOAA destinations. The combined Oct. '02 requirement is 4.8 mbps, and performance is 9.2, so the rating is "Good"

**4) NSIDC:**

Ratings: GSFC → NSIDC: Continued **Good**  
 NSIDC → GSFC: **Good**

Web Page: [http://corn.eos.nasa.gov/performance/Net\\_Health/files/NSIDC-EMS.html](http://corn.eos.nasa.gov/performance/Net_Health/files/NSIDC-EMS.html)

## GSFC ↔ NSIDC Test Results:

Source → Dest	Medians of daily tests (mbps)			User Flow	TOTAL
	Best	Median	Worst		
GSFC-DAAC → NSIDC	88.8	67.0	39.5	6.0	73.0
NSIDC → GSFC-DAAC	16.5	15.7	10.2	0.2	15.9

## Requirements:

Source → Dest	Date	mbps	Rating
GSFC → NSIDC	Oct '02	32.6 (prev 29.2)	<b>Good</b>
GSFC → NSIDC	Oct '03	38.2 (prev 53.1)	<b>Good</b>
NSIDC → GSFC	'02, '03	8.3	<b>Good</b>

Performance from GSFC to NSIDC remains steady, although the user flow was a bit lower (due to the adjustment in methodology). The Oct '02 requirements didn't increase much, and the Oct. '03 requirement dropped close to the '02 requirement, so the ratings for both years remain "Good".

Performance from NSIDC to GSFC is now being tracked, and exceeds the requirements by more than 30%, so is rated "Good"

## Other Testing:

Source → Dest	Medians of daily tests (mbps)			Requirement	Rating
	Best	Median	Worst		
JPL → NSIDC-SIDADS	5.96	4.81	3.12	0.77 (prev 0.26)	<b>Excellent</b>
LDAAC - NSIDC	4.80	4.66	4.47	0.07)	<b>Excellent</b>

Performance has been very steady from JPL since the Aug '02 BOP switchover, exceeding the modest requirement. This requirement grows to 1.5 mbps in April '03, and to 2.3 mbps in April '04; the rating would be "Good" compared to these requirements.

Thruput from LDAAC to NSIDC has been steady at about 5 mbps since 28 November. The very low requirement produces a rating of "Excellent".

**5) GSFC ↔ LaRC:**

Ratings: GDAAC → LDAAC: Continued **Good**  
 LDAAC → GDAAC: **Excellent**

Web Page: [http://corn.eos.nasa.gov/performance/Net\\_Health/files/LARC.html](http://corn.eos.nasa.gov/performance/Net_Health/files/LARC.html)

## Test Results:

Source → Dest	Medians of daily tests (mbps)			User Flow	TOTAL
	Best	Median	Worst		
GDAAC → LDAAC	89.2	59.0	25.8	12.9	71.9
LDAAC → GDAAC	25.4	24.2	15.3	0.8	25.0

## Requirements:

Source → Dest	Date	mbps	Rating
GDAAC → LDAAC	Oct '02	37.7 (prev 38.3)	<b>Good</b>
GDAAC → LDAAC	Oct '03	52.7 (prev 60.0)	<b>Good</b>
LDAAC → GDAAC	Oct '02	6.8	<b>Excellent</b>
LDAAC → GDAAC	Oct '03	44.8	<b>Low</b>

Performance has been stable since the BOP switchover in August '02. Requirements changes from GSFC → LaRC have been minor reductions. The Oct. '02 rating remains "Good", but the requirements drop improves the Oct. '03 rating to "Good" (was "Adequate").

The LaRC → GSFC requirement is now tracked. While the current performance is "Excellent", by FY '04 it is planned to backhaul all LaRC science outflow via GSFC, greatly increasing this requirement. A circuit upgrade will be required to meet this future requirement.

**6) GSFC → ERSDAC:**

Rating: ↓ Good → **Adequate**

Web Page: [http://corn.eos.nasa.gov/performance/Net\\_Health/files/ERSDAC.html](http://corn.eos.nasa.gov/performance/Net_Health/files/ERSDAC.html)

## Test Results:

Source → Dest	Medians of daily tests (kbps)			User Flow	TOTAL
	Best	Median	Worst		
GSFC → ERSDAC	795	778	439	57	835

## Requirements:

Source → Dest	FY	kbps	Rating
GSFC → ERSDAC	'02, '03	664 (prev 467)	<b>Adequate</b>

Thruput since June '02, using the 1 mbps ATM connection had been very stable until November 12, when performance became noisy and erratic. The problem was fixed on 3 Jan '03. However, with the revised requirements, the thruput is a bit below 30% above the requirement, so the rating is reduced to "Adequate".

**7A) US → NASDA:**Rating: ↑ Adequate → **Good**Web Page: [http://corn.eos.nasa.gov/performance/Net\\_Health/files/NASDA-EMSnet.html](http://corn.eos.nasa.gov/performance/Net_Health/files/NASDA-EMSnet.html)

Test Results:

Source → Dest	Medians of daily tests (kbps)			User Flow	TOTAL
	Best	Median	Worst		
GSFC-CSAFS → NASDA-EOC	2150	1807	533	392	2199
ASF → NASDA-EOC	2248	1925	514		

Requirements:

Source → Dest	FY	kbps	Rating
GSFC → NASDA	Oct '02	1612 (prev 1854)	<b>Good</b>
GSFC → NASDA	Oct '03	1379 (prev 1620)	<b>Good</b>

Performance steady -- about as expected for the 3 mbps ATM PVC (using multiple TCP streams to mitigate TCP window size limitation at NASDA). Results from ASF to NASDA were slightly better than from CSAFS. However, the reduced requirement improves Oct. '02 rating to "Good".

**7B) NASDA → US:**Rating: Continued **Good**Web Pages: [http://corn.eos.nasa.gov/performance/Net\\_Health/files/JPL-SEAPAC.html](http://corn.eos.nasa.gov/performance/Net_Health/files/JPL-SEAPAC.html)[http://corn.eos.nasa.gov/performance/Net\\_Health/files/GSFC-SAFS.html](http://corn.eos.nasa.gov/performance/Net_Health/files/GSFC-SAFS.html)

Test Results:

Source → Dest	Medians of daily tests (kbps)			User Flow	TOTAL
	Best	Median	Worst		
NASDA-EOC → JPL-SEAPAC	2328	2279	1227	0	2279
NASDA-EOC → GSFC-CSAFS	1395	1273	607		

Requirements:

Source → Dest	FY	kbps	Rating
NASDA → GSFC	'02, '03	1559 (prev 1374)	<b>Good</b>

Performance continues stable on the new circuit. The rating remains "Good", despite a 13% requirements increase.

Note: NASDA has not yet implemented testing with multiple tcp streams. So performance to GSFC is limited by the TCP window size on NASDA's test machine, in conjunction with the long RTT. Therefore, in order to reflect the actual capability of network, the rating is derived from testing from NASDA to JPL. This test uses the same Trans-Pacific circuit, but has a shorter RTT, so will not be as severely limited by the TCP window size. The Trans-Pacific circuit connects into the higher speed domestic EMSnet at JPL, which is not expected to be the limiting factor.